



Evaluation of the Effectiveness of Environmental Dredging at Contaminated Sediment Sites

EPA Forum on Managing Contaminated
Sediments at Hazardous Waste Sites

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Overview

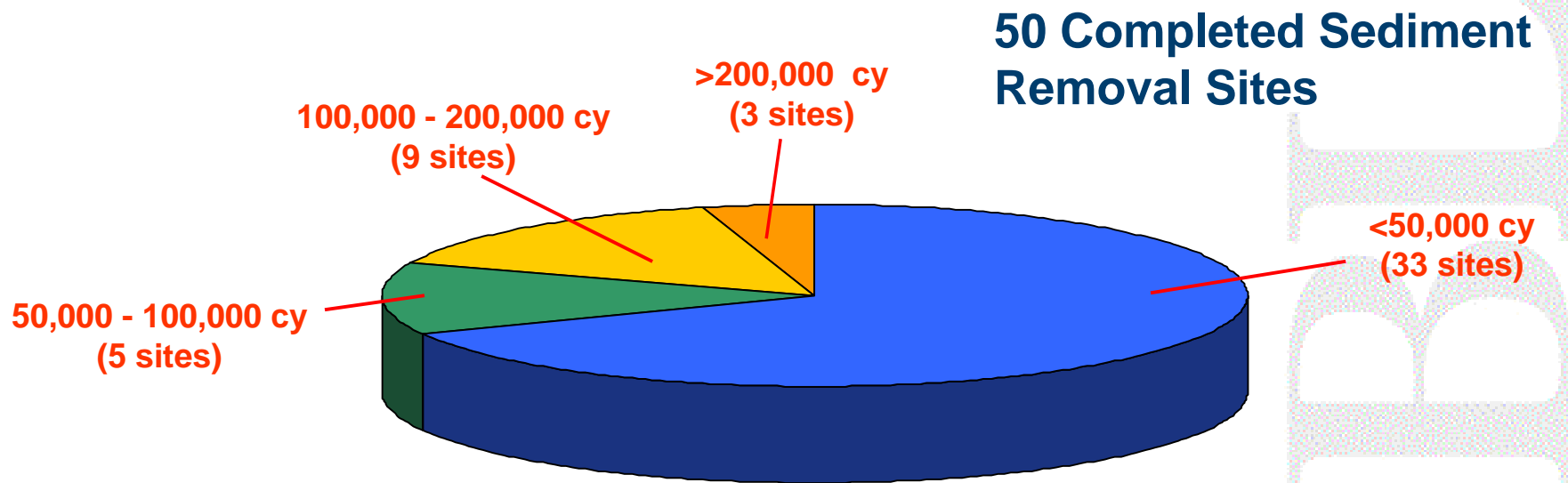
- Environmental Dredging Effectiveness Framework
- Completed Projects/Available Data
- Results from Completed Projects
- Lessons Learned
- Discussion

Dredging Effectiveness Framework

- Focus on Net Risk Reduction
- Important Risk-Reduction Parameters
 - Fish tissue concentrations
 - Water column concentrations
 - Surface sediment concentrations
 - Habitat quality
- Other Parameters
 - Schedule
 - Cost



Completed Projects



- Central repository:
Major Contaminated Sediment Sites
Database (Release 3.0) available at
www.hudsonvoice.com
- Sites are relatively small
- Limited monitoring data
- Limited documentation

Most experience is limited to small sites and data are sparse.

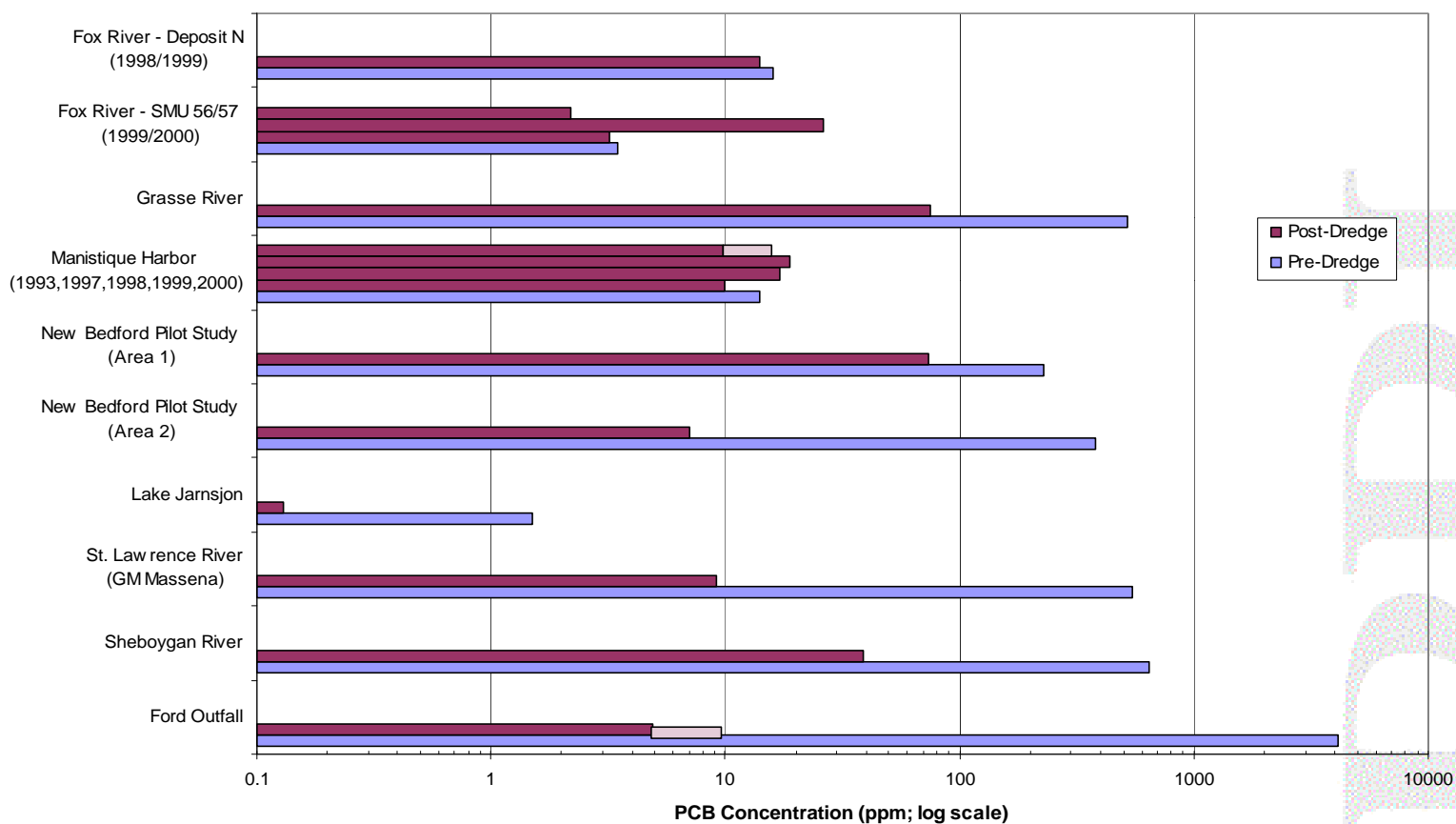
St. Lawrence River - GM Massena: Hydraulic Dredging

- 11-acre area of nearshore sediments dredged in 1995
- Goal → 1 ppm PCB (sediment)
- Mechanical debris removal and hydraulic dredging (horizontal auger)
- 1 ppm cleanup goal unachievable (up to 30 passes)
- Average surficial PCBs → 9.2 ppm
- One area capped after removal



1 ppm PCB cleanup goal for sediment was unachievable, even with significant effort.

Average Surface Sediment PCB Data at Select Dredging Sites



Reduction to typical guidance levels (i.e., < 1 ppm) not consistently demonstrated.

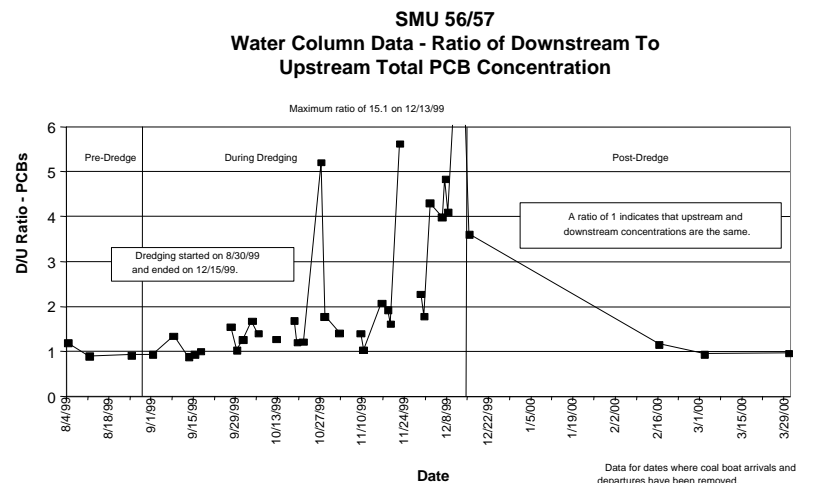
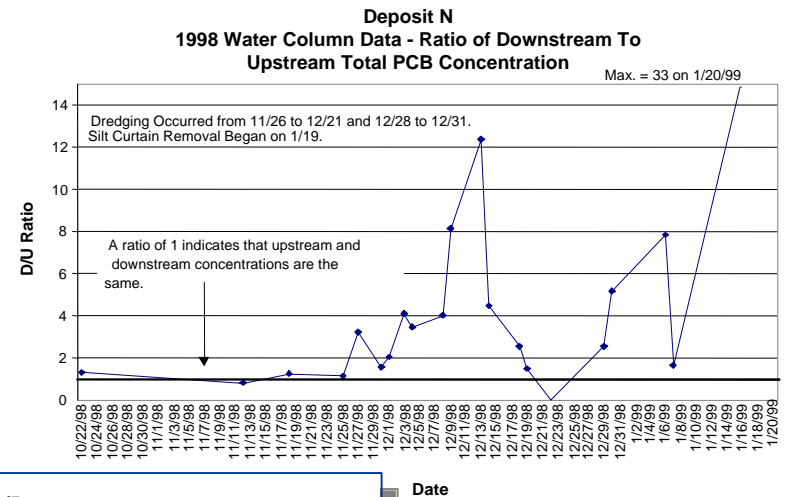
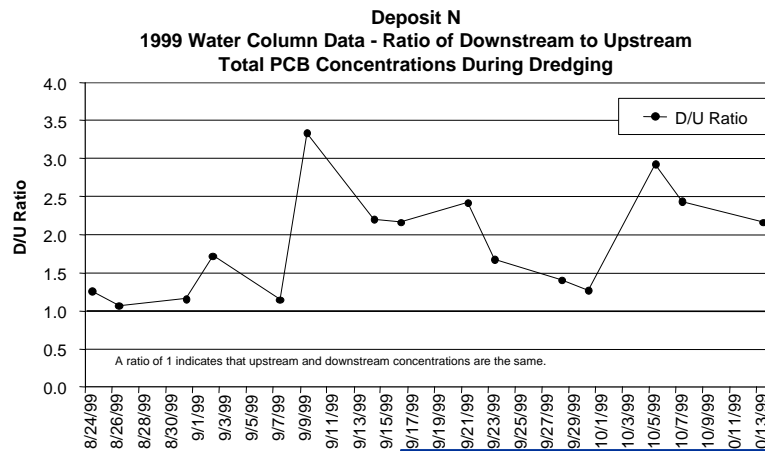
Grasse River - Massena, NY

- 3,000 cy sediment and debris with PCBs removed in 1995 Mechanical debris removal and hydraulic dredging (horizontal auger)
- Sediment dewatered and disposed on site
- Goal: Removal of “all” sediment
- Heavily studied/monitored program
- Silt containment retained TSS
- Elevated PCBs observed downstream during operations (water & caged fish)

PCB releases were observed during dredging and were bioavailable.

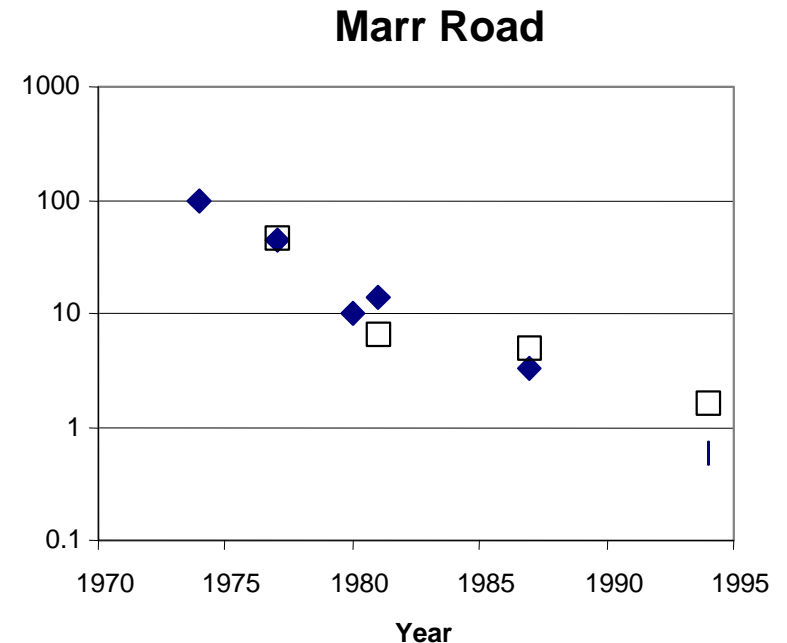
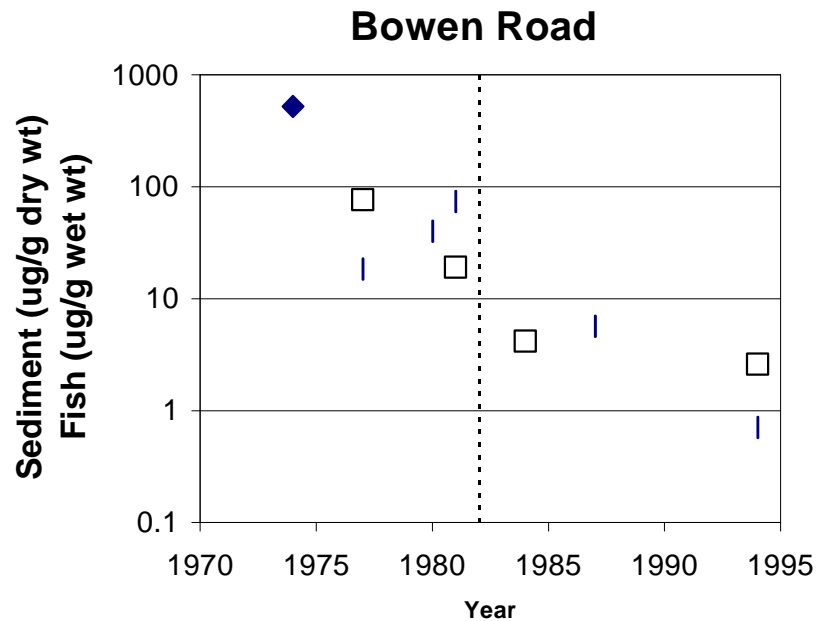


Fox River



Evidence that PCBs were released from the dredging operation.

Shiawassee River



◆ Sediment □ White Sucker fillet Remediation

**Total PCB concentrations in white sucker and sediments
from the Shiawassee River**

**A simple comparison of before and after ignores the
observation that natural recovery was ongoing and continuing.**

Biota Data

- Surprising Paucity of Data
- Complications With Interpretation:
 - Ongoing Natural Recovery
 - Distinguishing from other remedial efforts
 - Source Control
 - Containment
 - Sampling Location Comparability
 - Impacts from Remedy Itself
- Habitat Data Practically Non-Existent

Schedule/Cost

- Projects Take Longer Than Expected to Complete
 - On average, schedules have extended by 117%
- Average dredging project cost (44 projects) = \$431/cy
 - On average costs have increased by 66%
- Much more costly than navigational projects
 - Environmental controls
 - Secure disposal
 - Sediment/water conditioning
- Diminishing economies of scale

Lessons Learned

- Most experience to date limited to relatively small sites
 - Limited available data
- Project goals vague and inconsistent
- Dredging has limitations in reducing surface layer PCB concentrations
 - Some instances capping necessary after dredging
- Elevated water column PCB concentrations during dredging even though solids may be contained
- Effects of dredging on fish tissue concentrations not quantifiable
- Programs take longer than expected
- Dredging is costly

Discussion

- Need consensus on how to measure success
- Develop agreement on scientific review of completed projects
- Recognize lessons learned in future decision making